

Contaminants in Private Well Water: Engaging Community Partners in Long-term Change

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Dartmouth Toxic Metals Superfund Research Program

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Overview

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 - Intervention Implementation
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 - *Be Well* Informed
- Potential Next Steps
- Questions



Dartmouth Toxic Metals Superfund Research Program: Four Interrelated Research Projects

Sources and protracted effects of early life exposure to arsenic and mercury on human health

1. Arsenic uptake, transport and storage in plants
2. Methylmercury production and fate in response to multiple environmental factors
3. Arsenic and innate immunity in human lung
4. Epidemiology, biomarkers and exposure assessment of metals



Parents & Expectant Parents

Consumers

LEARNING

Community Engagement Core

SHARING

SERVING

Prenatal Mercury & Arsenic Exposure

RICE

ARSENIC in BEDROCK WELLS

Rockingham Co. New Hampshire

High School Science Students

©SCAVONE

A portrait of a woman with curly brown hair, wearing an orange top, sitting in a wooden chair. A bookshelf is visible in the background.

My Community Public Health Principles

- “Nothing About Us Without Us”
- Meeting people and communities “where they are at”
- Education alone does not create instant behavior/community change
- A single action will not create lasting change
- Communities are the key to community change
- There are always lessons to be learned and improvements to be made



Grant Background

Assessing and Managing Risks Associated with Exposure from Arsenic in Private Wells

- New Hampshire Department of Environmental Services (NH DES) led this project.
- Primary funding was provided by a 2 year CDC grant
- A **Project Advisory Team (PAT)**, made up of national and regional community partners, helped with planning and decision making.
- A **Technical Advisory Committee (TAC)**, composed of local environmental health and science experts, helped with planning and decision making.
- Dartmouth Team
 - Mark Borsuk, Project Leader
 - Laurie Rardin, Michael Paul and Kathrin Lawlor, Project Coordinators
 - Thomas Hampton, Biostatistician

Project Aims

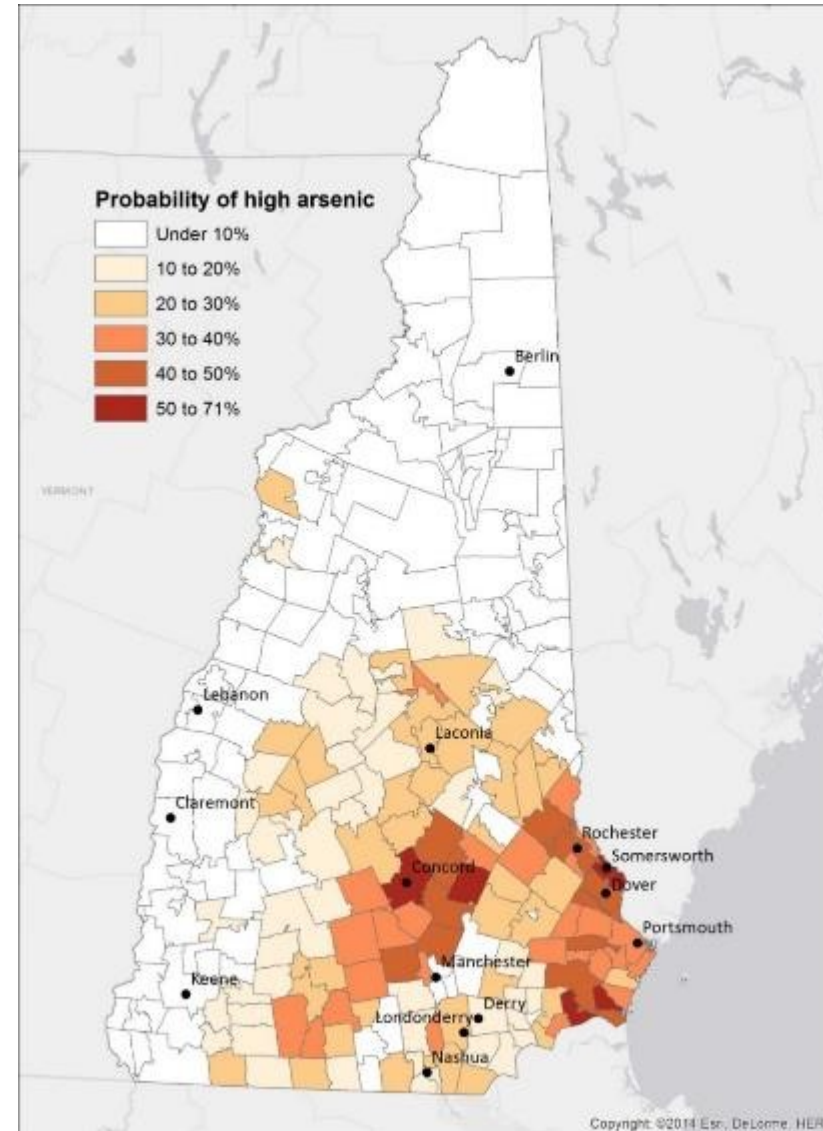


Major Aims

- A. Design and implement a **statewide survey** to estimate rates of well water testing and treatment for arsenic;
- B. Identify **important barriers** to water testing and treatment and associated **target populations**;
- C. Design, implement, and evaluate **interventions** to overcome identified barriers;
- D. Create a **toolkit for communities** to assist with planning interventions of their own.

Arsenic and Private Wells in NH

- NH DES estimates that more than 46 percent of New Hampshire residents rely on private wells at home.
- Most arsenic in NH comes from bedrock aquifers.
- The southeastern region of the state has the greatest potential for arsenic over 10 ppb.

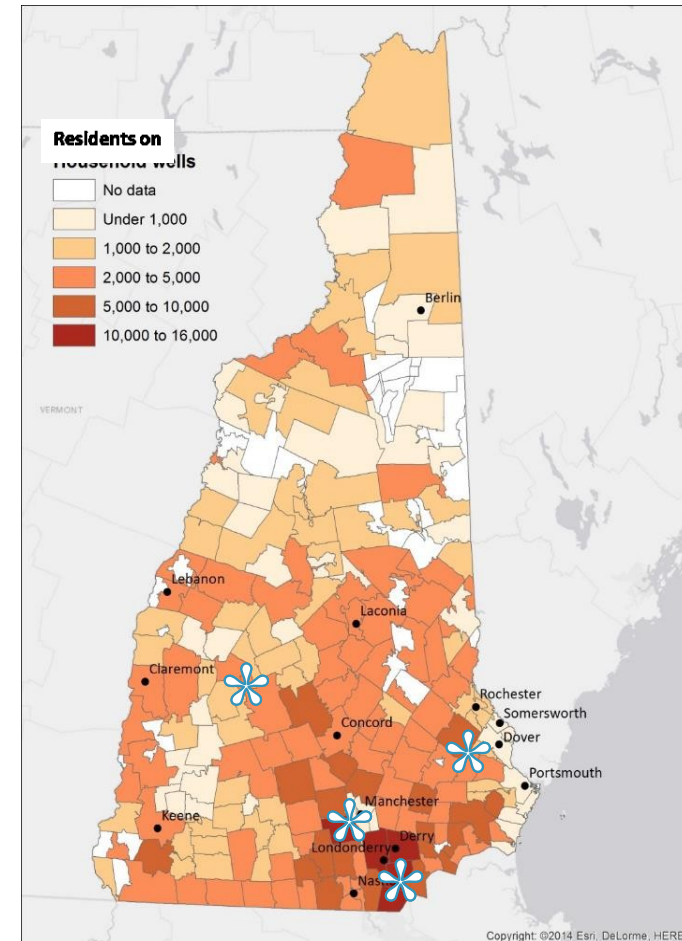


Year One

- Focus Groups
- Statewide Survey
- Intervention Selection

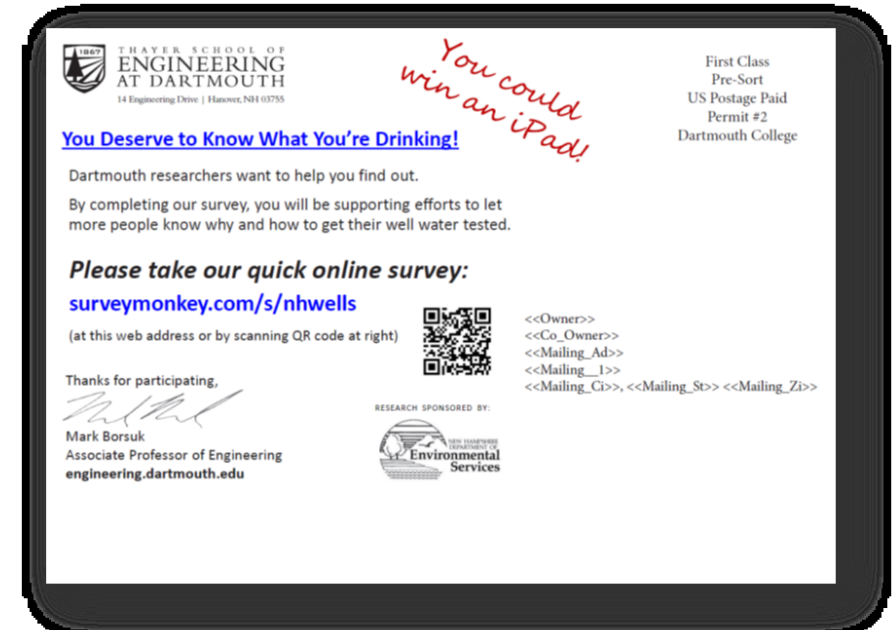
Focus Groups

- KEY FINDINGS:
 - Participants associated well water quality with **taste, smell, and appearance**
 - A majority of participants recalled testing their water during a **real estate transaction**
 - Participants **identified cost, inconvenience, and lack of awareness** as the major barriers to regular water testing
 - Many currently treating their water were doing so to address **aesthetic concerns**
 - Those with treatment systems had **not tested water** after treatment was installed
 - **Cost** deterred participants from treating their water



Statewide Online Survey

- Implemented Spring – Summer 2014
- Survey included 31 to 40 questions
- Postcards were sent to about 7,200 addresses with wells, stratified by town according to estimated arsenic concentrations
- 700 responses in total
- **Respondent Demographics**
 - 88% lived in a single family residence
 - 76% have lived in NH for over 10 years
 - Respondents were equally male and female
 - 96% were Caucasian
 - 54% were employed full time



Survey Analysis – Did Test

- 82% of respondents drink their tap water “always” or “frequently.”
- Among the 80% of respondents who did test their water
 - The most common time since testing is 3-10 years ago (29%).
 - The strongest considerations for testing were:
 - “I wanted to know if the water was safe to drink” (77%)
 - “I had it tested as part of a real estate transaction, or a real estate agent recommended it” (40%).

Survey Analysis – Test Results

- **74%** of respondents initially understood the test results they received from the lab.
- **64%** of respondents initially understood what actions they should take in response to the test results.



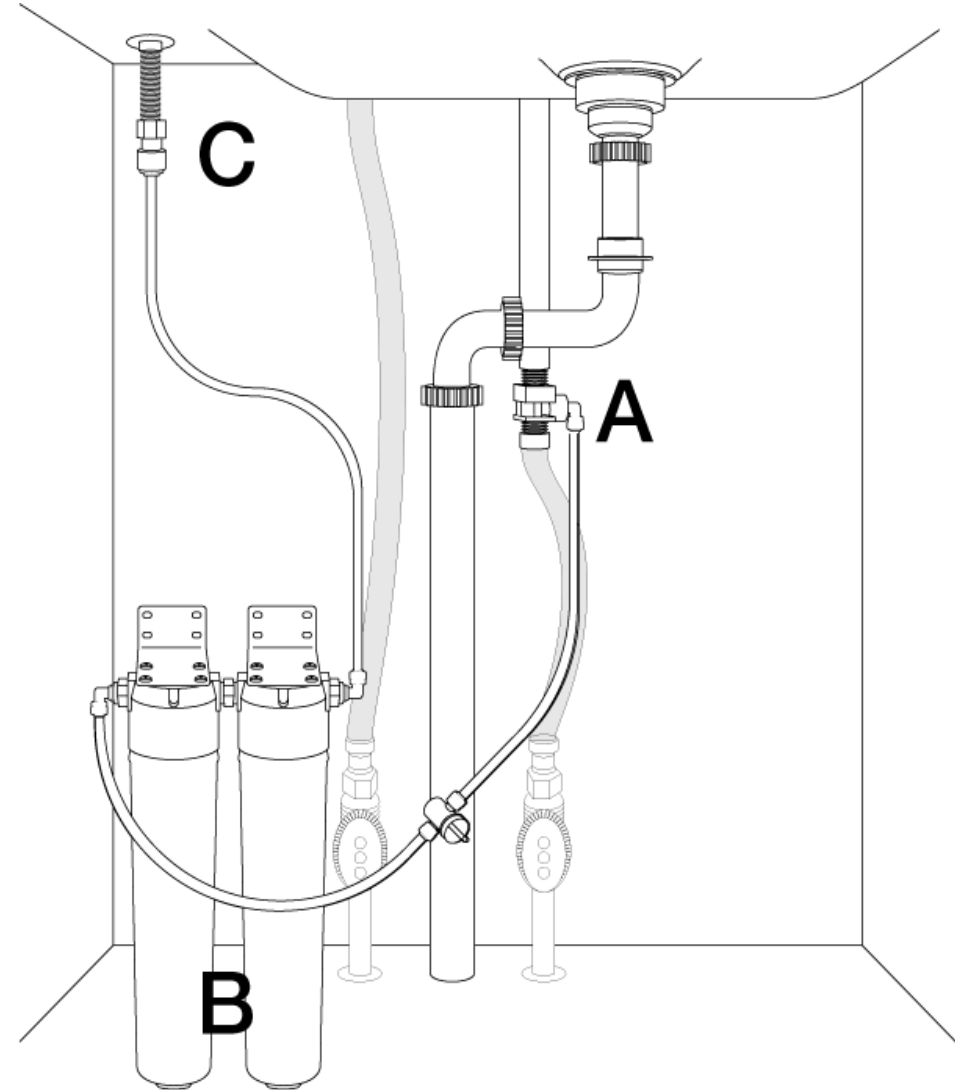
Survey Analysis – Did Not Test

- Among the **20%** of respondents who did not test their water, the most common reasons for not testing were:
 - “I meant to have it tested but never got around to it” (42%),
 - “I didn’t know how to go about having it tested” (38%),
 - “The water looks, smells, and tastes clean” (33%),
- About **40%** of well owners from higher risk arsenic towns have not tested their water for arsenic.



Survey Analysis – Do Treat

- Among the **67%** of respondents who treat their water:
 - **39%** have never tested their water since starting to use their water treatment system,
 - **46%** of those who treat their water and state that their intent is to remove arsenic actually do not have treatment systems that are effective at arsenic removal.



Survey Analysis – Do Not Treat

- Among the 33% of respondents who do not treat their water:
 - Only 46% have had their water tested, and received results suggesting there was no need to treat.
 - 16% believe a treatment system is too expensive or difficult to install, use, and maintain.



Intervention Selection

Intervention	Town					
	1	2	3	4	5	6
A	X		X	X		X
B	X	X		X	X	
C		X	X		X	X

Utilizing experimental design, each of the three interventions will be implemented four times, every combination of two interventions will be duplicated, helping with intervention analysis.

After reviewing survey results, 24 possible interventions and consultation with the **PAT** and **TAC**, three local level interventions were selected for implementation in 6 towns:

- **Town Communications**
 - Utilize town communication channels to distribute messages to town residents
- **Intercept Campaign**
 - Meet people at community “hot spots” to discuss the issue
- **Testing Events**
 - Distribute kits to residents at a central location

Year Two

- Town Selection
- Communication Materials
- Intervention Implementation
- Intervention Evaluation
- Well Water Community Action Toolkit**
- Be Well* Informed

Town Selection

- **Southeastern New Hampshire**
- **Pre-Readiness Screening**
 - The probability of a town having an arsenic average above 10 parts per billion
 - The number of people served by wells.
- **16 Towns selected for additional screening**
- **10 Additional Screening Criteria**
 - Example: Does the town have a champion or leader on this issue?
 - Example: Does the town have an existing ordinance regarding arsenic in well water?

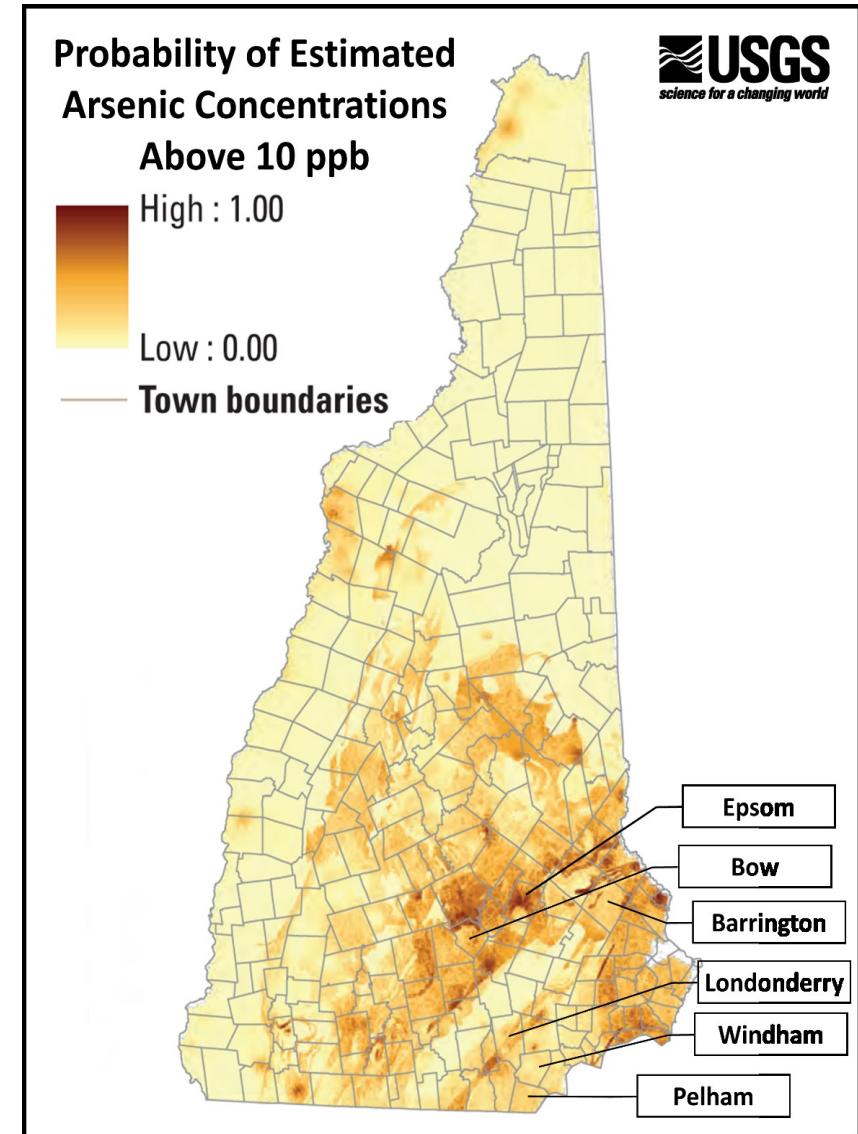
Town Selection

- **8 Towns selected for Community Readiness Interviews**
- **Community Readiness Model Overview**
 - The Community Readiness Model was developed by researchers at the Tri-Ethic Center for Prevention and Research @ Colorado State University.
 - If a community is not ready to address an issue it can be more difficult to engage partners and create lasting change
 - Conversely a community with a high level of awareness will be more prepared to address this issue in a long-term, comprehensive way
- **22 individuals from 8 towns were interviewed and results were scored**

1	No Awareness
2	Denial/Resistance
3	Vague Awareness
4	Preplanning
5	Preparation
6	Initiation
7	Stabilization
8	Confirmation/Expansion
9	High Level of Community Ownership

Town Selection

Town	Town Communication	Intercept Campaign	Testing Event
Barrington	X		X
Bow	X		X
Londonderry		X	X
Windham		X	X
Pelham	X	X	
Epsom	X	X	



Communication Material

- 3 Focus groups were held in April 2015
- Additional input was provided by the PAT and the TAC

- **Visual Themes**

- Infographic
- Professional Public Health
- Photo Journalism
- Testimonial

- **Message Themes**

- Risk of Exposure
- Health Risks
- Social Norm
- Barrier Resolution/ Solutions



Community Health Institute
New Hampshire's Public Health Institute

Communication Materials

Feedback on Visual Theme 5

You can't see it, You can't smell it, and you can't taste it.

Comments:

- Good picture, need to connect the dots that it is harmful to drink and cook. They might not think of the harm related to cooking.
- Too sterile. Looks like a lab.
- Colors don't seem appropriate, colors should convey some danger.
- Too bland.

Motivational Score: 3.0 out of 5

Feedback on Visual Theme 8

You can't see it, You can't smell it, and you can't taste it.

Comments:

- I like this one,
- Add showering and cooking as a harmful activity if you have arsenic. This shows only people drinking.
- Like diversity of people, add diversity of action.
- Not appealing.
- This poster is attention grabbing. Like the speckled/ crackled font better than solid font.
- The darker blue is soothing – but make it brighter.
- Add costs and time.
- Colors do not grab me.

Motivational Score: 3.7 out of 5

Feedback on Visual Theme 11

You can't see it, You can't smell it, and you can't taste it.

Comments:

- Conveys that it is a serious issue.
- I like the red.
- The positives are her look of concern and the red color.
- Shirt and lettering need more contrast.
- The word 'water' is hard to read
- I like the testimonial statement.
- Looks worried and sick.
- Make her shirt more modest.
- Use "crackly" font.

Motivational Score: 3.4 out of 5

Feedback on Visual Theme 1

ARSENIC IN OUR DRINKING WATER

As

Comments:

- Quick facts are appealing.
- Make the icon with children bigger. They are more compelling.
- Like the layout of this poster. It is clean, #s and charts are easy to read.
- Like colors. Like the use of the statistic - 1 in 5.
- Would like the cost of the testing on the poster.
- Like the mention that it only takes 10 minutes.
- Soft blue is appealing.
- Periodic table is too sophisticated.

Motivational Score: 3.3 out of 5

You can't see it, You can't smell it, and you can't taste it.

Comments:

- Her face and font looks scary – eyes too wide for drinking water. Arsenic word is more grabbing. It is brighter and feels urgent to act.
- Model does not look natural.
- Like the statement "You can't see it, You can't smell it and you can't taste it."
- Looks like only drinking the water is the issue.
- Scary!
- Prefer "your" to "our" well water.

Motivational Score: 2.8 out of 5

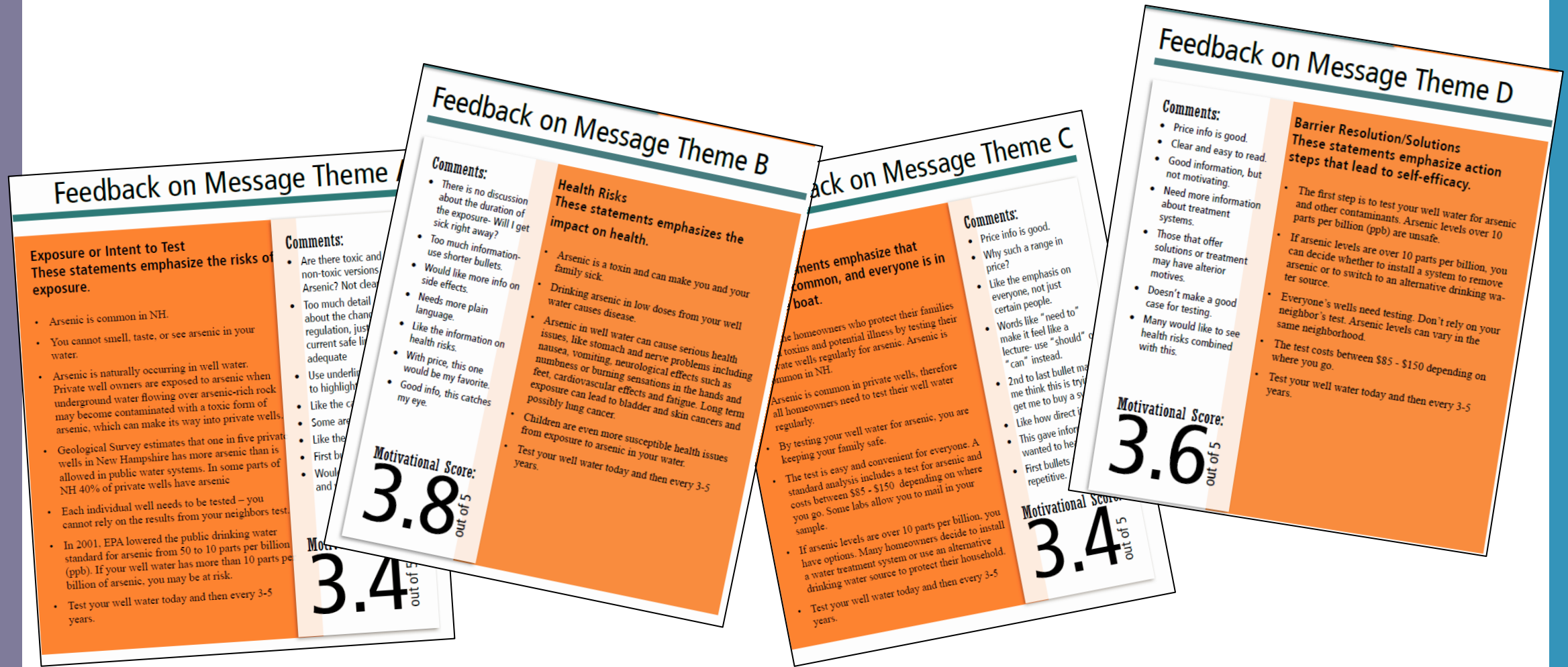
You can't see it, You can't smell it, and you can't taste it.

Comments:

- Good poster for pediatrics office. Looks like an ad in a magazine.
- Leaves no impression. Would skip over.
- I am so done with the baby thing. (Many agreed with this statement.)
- Reminds me of a generic advertisement.
- Baby too prominent.
- Center headline from other posters would be good on this one.
- Looks like it is promoting sippy cups.

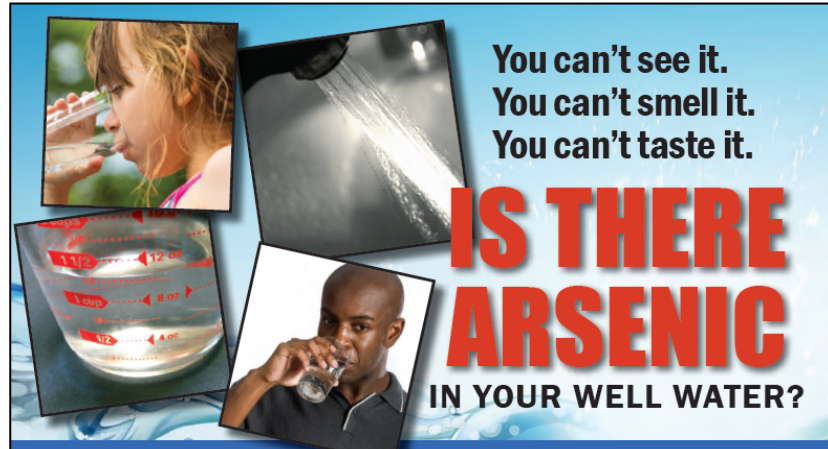
Motivational Score: 3.3 out of 5

Communication Materials




Communication Materials

Final Flyers



**You can't see it.
You can't smell it.
You can't taste it.**


IS THERE ARSENIC IN YOUR WELL WATER?



1 in 5
homeowners' wells in New Hampshire contain unsafe levels of arsenic


\$15
dollars

is all it costs to test your well water for arsenic



10
minutes

is all it takes to collect a water sample



3-5
years

is the recommended frequency for testing

ARSENIC IS COMMON IN WELL WATER.

- Arsenic is present in New Hampshire well water because of the state's granite and other types of rock.
- Arsenic in well water can cause **serious health issues over time**, such as heart problems and bladder, skin, and lung cancer.
- **Children are especially vulnerable** to the effects of arsenic in water.
- Everyone's wells need testing, so **do not rely on the results of your neighbor's test**. Arsenic levels vary from house to house.
- **Common treatment methods**, such as boiling, pitcher filters, or a water softener, **do not remove arsenic**.
- There are **many resources available** to help! We suggest you start at: <http://www.dartmouth.edu/~toxmetal/arsenic>

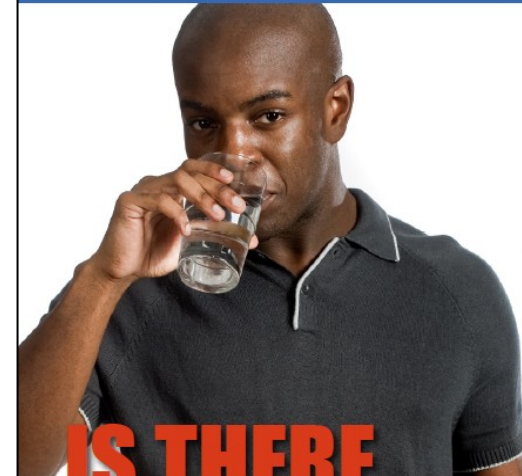
TESTING YOUR WATER IS EASY.

- The first step to keeping your family safe is to test your well water for arsenic and other contaminants.
- The cost to test your water ranges from about **\$15 for just arsenic to \$85 for a standard package** of tests of the most common contaminants.
- **Sample collection bottles are easily available** from state or private labs. Bottles **can be mailed to you** and samples **can be mailed back**. Directions will be included in your kit.
- If testing shows that you have unsafe levels of arsenic, there are **reliable options** to address it.
- For a list of certified labs, visit: <http://www2.des.nh.gov/CertifiedLabs>

TEST YOUR WATER TODAY, AND THEN AGAIN EVERY 3 TO 5 YEARS.

Visit <http://www.nhwellwatertest.org/>

You can't see it. You can't smell it. You can't taste it.



“

I had no idea the water we were drinking and cooking with was unsafe. I have lived in my house for 10 years and didn't realize I had arsenic in my water that could affect my family's health. It looked, smelled and tasted fine. The fix was easy and not too expensive. I feel so much better knowing the water is safe to drink.

”

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Award
Winning

Communication Materials

Final Postcards

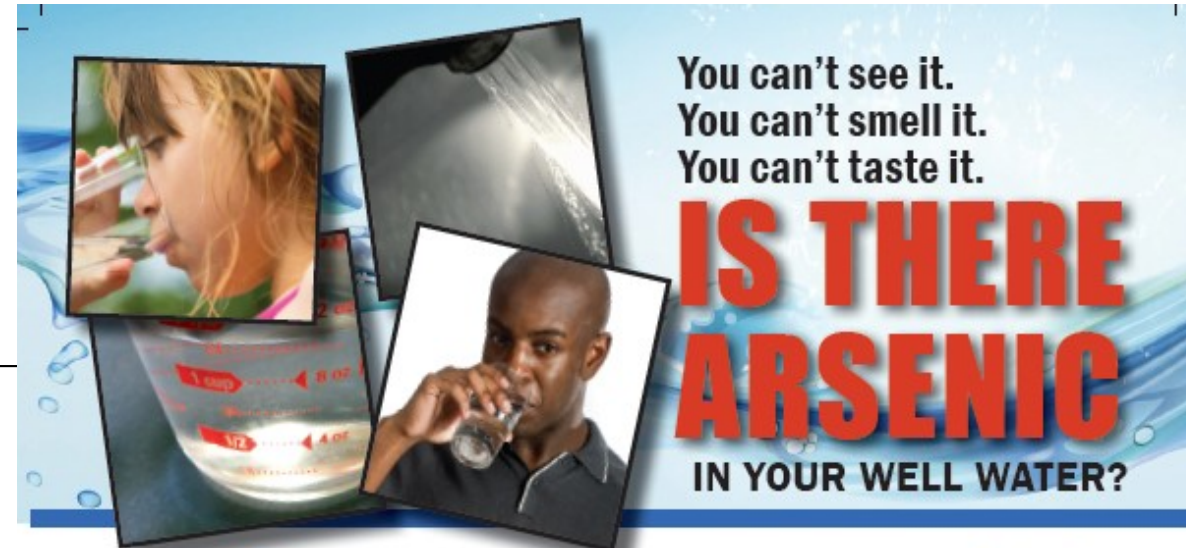
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1 in 5
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unsafe levels of arsenic


15 dollars
is all it costs to test your
well water for arsenic


10 minutes
is all it takes to
collect a water sample


3-5 years
is the recommended
frequency for testing

Intervention Planning + Implementation

- 6 Towns
- 14 Planning Partners
- 12 In-person Events
 - 8 Intercept
 - 4 Testing Events
- 2.5 Month Intervention Period
- 6 Inside Events
- 6 Outside Events
- Each event was between 4-8 hours long
- Most events had two staff
- 2 events had community volunteers helping out

	Day/ Date	Town	Intervention	Location
#1	Sat. May 16 th	Londonderry	Intercept	Lions Club Yard Sale
#2	Tues. June 2 nd	Pelham	Intercept	Library
#3	Sat. June 6 th	Windham	Intercept	Community Garden Kickoff Event
#4	Sat. June 13 th	Windham	Intercept	Library
#5	Sat. June 20 th	Bow	Testing Event	Community Building
#6	Thurs. June 25 th	Windham	Testing Event	Town Offices
#7	Tues. July 7 th	Pelham	Intercept	Pelham Place (outside mall near Hannaford)
#8	Sat. July 11 th	Londonderry	Intercept	Londonderry Drop Off
#9	Monday July 13 th	Epsom	Intercept	Library
#10	Sat. July 18 th	Barrington	Testing Event	Transfer Station
#11	Fri. July 24 th	Londonderry	Testing Event	Town Offices
#12	Sat. Aug 8 th	Epsom	Intercept Event	Old Home Day

Intervention Evaluation

All Towns		Testing Event	Intercept Campaign	Town Communications
Process Measures	Exposure	310 attendees	414 attendees	Messaging in 4 towns
	Engagement	253 test kits distributed	149 attendees; ~13 test kits requested	~18 test kits requested
Intent to Test	# of test kit requests	290		
Change in Testing Behavior	Test kits returned	45 (15.5% of those that received a test kit; 0.2% of households)		
	Change in tests (baseline 2014)	97.3% increase (2015: 73; 2014: 37)		

Evaluation of Intervention Effectiveness

- Testing Events were effective at increasing testing when preceded by Town Communications, but not when preceded by an Intercept Campaign.
- The combination of Town Communications and Intercept Campaign alone were not effective in significantly increasing testing.



Community Toolkit



Well Water Community Action Toolkit

Congratulations on deciding to address private well water safety in your community. This toolkit was designed to help communities increase private well water testing and treatment. In this toolkit, you will find:

- Background information on private wells in New Hampshire
- A step-by-step guide for planning community activities
- Useful resources
- Communication materials
- Project planning worksheets

This toolkit may be used progressively from start to finish or you may choose to jump to the most relevant section that meets your community's needs. Either way the guidance and information provided here will help you work with your community partners and, over time, will create lasting community change.

Toolkit Table of Contents

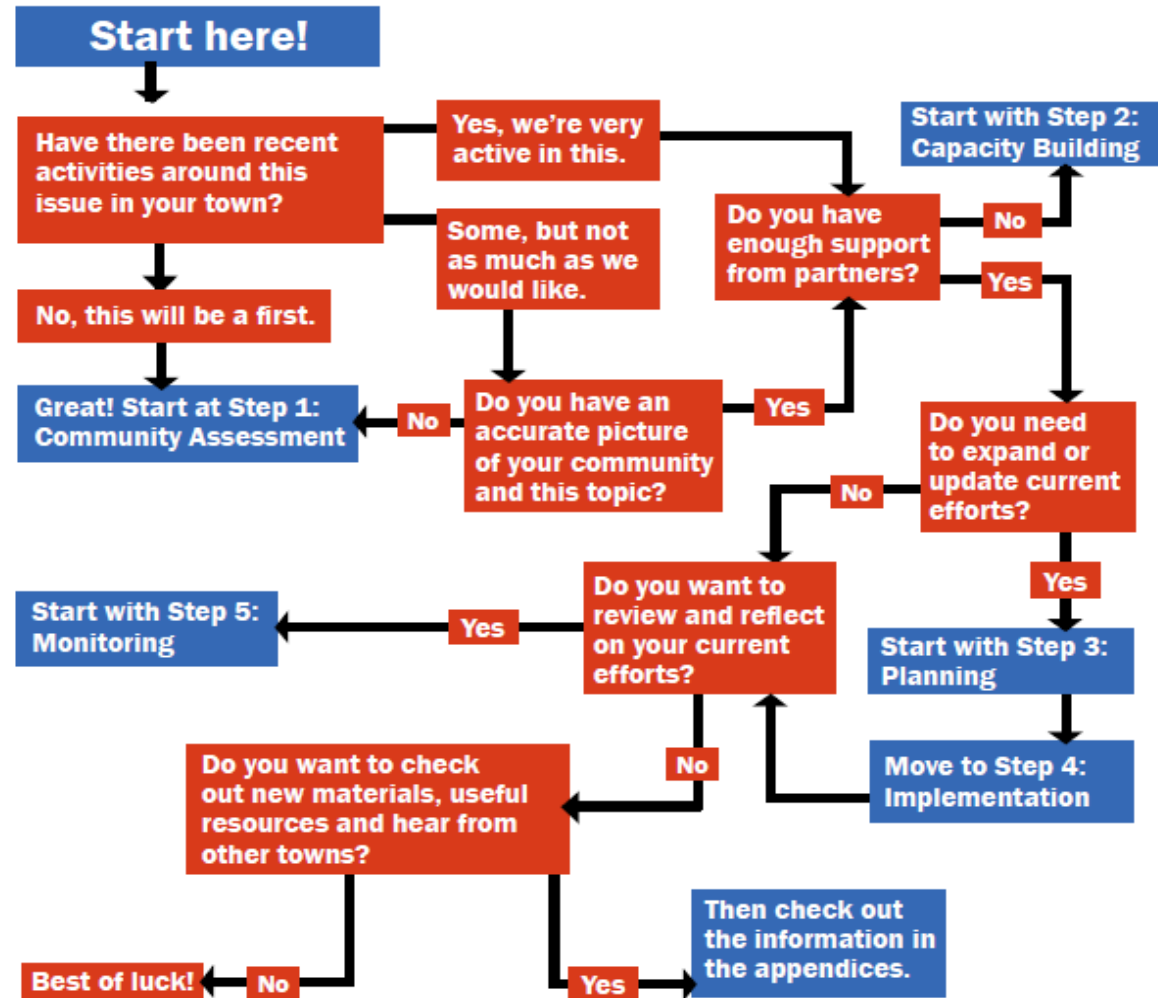
- Introduction
- Where should you start?
- Creating a plan that works for you and your community
 - Assessment
 - Capacity Building
 - Planning
 - Implementation
 - Monitoring
- Additional Resources and Local Experts
- Appendix A -- Interventions and Communication Materials
- Appendix B -- What works in NH
- Appendix C -- Planning Worksheets

Community Toolkit

Introduction

- Why use this toolkit?
- What is an intervention?
- Understanding contaminants in private well water in NH
- A comprehensive approach

Where should you start?



Community Toolkit

Creating a Plan that Works for You and Your Community

- **Community Assessment**

- What is already happening in your town?
 - What has or has not worked in your community before?
 - What are the current gaps?
 - Identification of community resources.

- **Capacity Building**

- Who is already involved or who should be?
- Review of community sectors.

Community Toolkit

Creating a Plan that Works for You and Your Community

Planning:

1. Identify your general goal
2. Identify your audience
3. Select your intervention
4. Choose a specific success measure
5. Identify your timeline
6. Setting up logistics

Community Toolkit

Creating a Plan that Works for You and Your Community

- **Implementation**

- Utilizing volunteers
- Educating volunteers on the topic
- Plan for weather issues
- Track your measures as you go
- Publicize events well in advance!

- **Monitoring**

- Track your efforts on the day of the event – you will forget details if you don't
- Reflection on the whole process
 - What worked?
 - What didn't?
 - What surprised you?

Community Toolkit

Additional Resources

Appendix A

Additional Resources and Local Experts

WEB LINKS

NHDES Private Well Testing Program
http://des.nh.gov/organization/divisions/water/dwgb/well_testing/index.htm

Be Well Informed Water Treatment Tool
<http://xml2.des.state.nh.us/DWITool/>

Environmental Protection Agency Ground Water
<http://water.epa.gov/type/g/groundwater/index.cfm>

Dartmouth Toxic Metals Superfund Research Program
<http://www.dartmouth.edu/~toxmetal/>

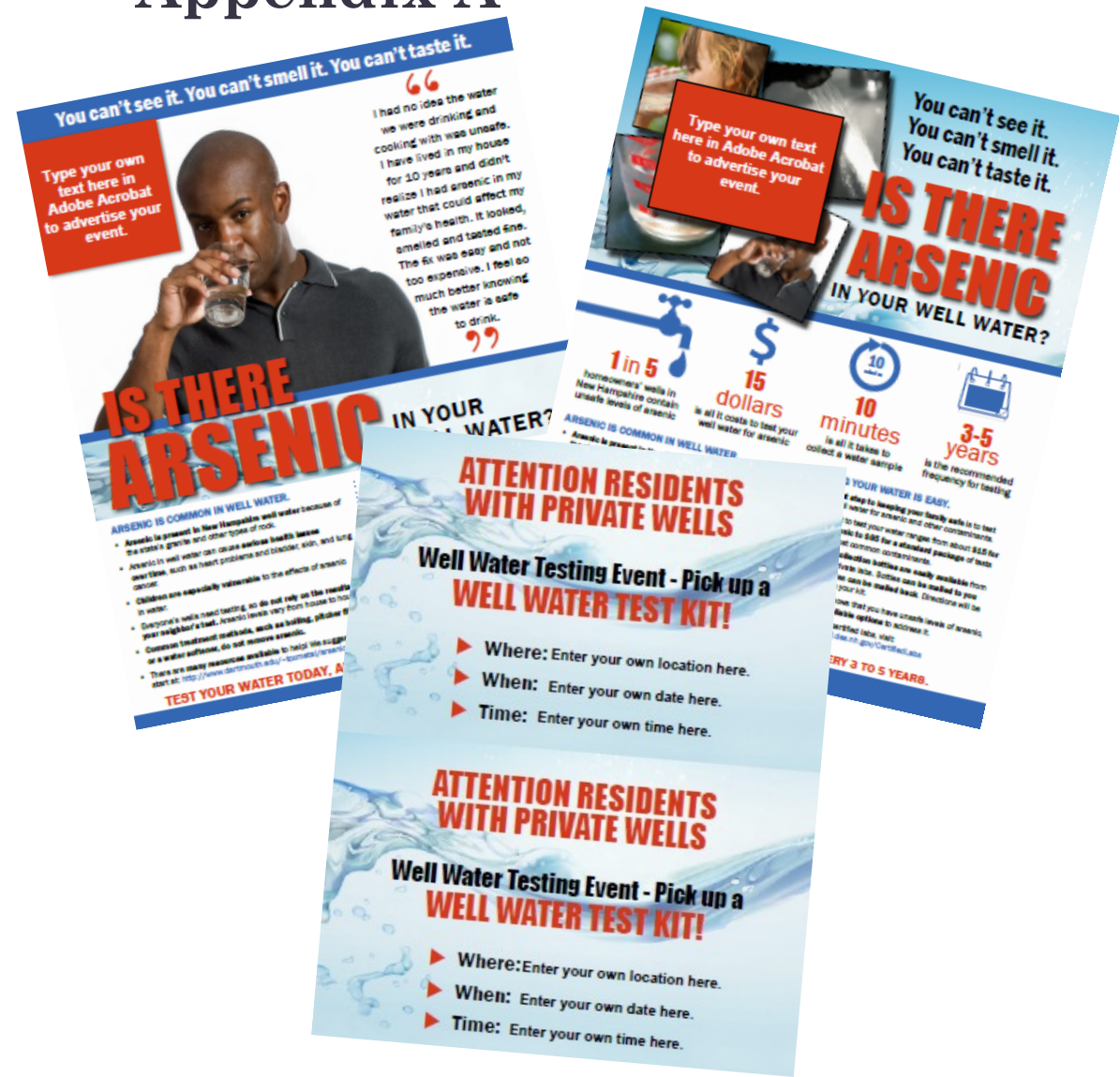
STATE PARTNERS

Dartmouth Toxic Metals Superfund Research Program
(603) 650-1524
<http://www.dartmouth.edu/~toxmetal/>

NH DHHS Public Health Laboratories
(603) 271-4881
<http://www.dhhs.nh.gov/dpha/lab/index.htm>

NH Department of Environmental Services
(603) 271-2513
<http://des.nh.gov/organization/divisions/water/dwgb/index.htm>

NH DHHS/DPHS Environmental Public Health Tracking Program
(603) 271-4988
<http://www.dhhs.state.nh.us/dpha/index.htm>



Community Toolkit

Appendix B

WHAT WORKS IN NH?

A LOOK AT COMMUNITY EFFORTS IN BOW AS DESCRIBED BY A COMMUNITY MEMBER

How did your community get started addressing well water testing and water quality?

In 2005, the Drinking Water Protection Committee was established by the Select Board to help develop source water protection plans for municipal facilities. The committee recognized the need to protect water quality and over time has added private well testing to the topics it addresses.

Who is involved with this effort in your town?

The Drinking Water Protection Committee – a group of volunteers, including those representing the school board, planning board, and conservation commission, as well as representatives from the department of public works, operator of the municipal well system. We have also had interested residents participate on individual projects without the commitment of being a member of the committee.

How long have you been working on it?

Although the committee was formed in 2005, the committee's attention to education about private well testing has occurred within the past 5 years.

Has your group or team identified any short or long-term goals?

While we have a plan that addresses protection of drinking water and groundwater through various means, we have not yet establish goals in the area of private well testing.

Please describe some of the activities you have implemented in your community:

We have been distributing well test kits at town events, such as town meeting, voting days, and school open houses. In addition, we have made well testing, drinking water quality and septic system maintenance information available on a display board. We have had great cooperation from our school district in helping publicize well testing events and allowing us to have a table at school open house events. These activities are in addition to other work we have done, such as developing a Well Head Protection Program Implementation Plan for Bow's new one-million gallon a day municipal water supply, developing criteria for identifying land for protection/purchase by the town for drinking water protection, and conducting a study in response to homeowner complaints about water quality affecting their well pumps and the possible involvement of road salt.

A LOOK AT COMMUNITY EFFORTS IN BOW, CONTINUED

What have you learned along the way? Have you hit any snags along the way?

While we have been available at town events and have had mixed success (more limited response than we had hoped), our recent participation in Dartmouth and DES's Arsenic project showed us that we can have a successful stand-alone event distributing water test kits as long as it is well publicized – and we know what that means as well!

Any advice you would offer a person or community group just getting started?

Assemble existing educational materials and make them available to residents and businesses in your town – on the web, in town offices and at local events. While you may want to start with participation at town events, holding a well testing kit distribution event that is well publicized may bring out interested people who have bypassed your display at other events. The support of your Select Board or Town Manager can contribute to the success of your efforts, so work with them – and seek their input and support.

WHAT WORKS IN NH?

A LOOK AT COMMUNITY EFFORTS IN TUFTONBORO AS DESCRIBED BY A COMMUNITY MEMBER

How did your community get started addressing well water testing and water quality?

We attended a NH DES Drinking water conference and heard a compelling lecture on arsenic in well water. We realized that only we had the motivation to make it happen.

Who is involved with this effort in your town?

The Conservation Commission with the support of the Selectmen.

How long have you been working on it?

Four and one half years. In that time we have helped process about 400 well tests.

Has your group or team identified any short or long-term goals?

Yes, to continue to offer the program and look for new and more effective ways to educate and involve the public.

Community Toolkit - Appendix C

Assessment of Current or Past Efforts						
Event/ Effort	Resources Used	Implementation Group	Target Audience	Timeframe	Measure	Lessons Learned
Example: Clean Water Day	<ul style="list-style-type: none"> Created posters and about importance of well water testing 	Pelham Middle and High School	Science classes	Each April 15 th , for the past 5 years	# of posters posted	Other community groups to take part?
Well Water Awareness Announcement	<ul style="list-style-type: none"> Newsletter Writer/ creator for announcement Editor for announcement 	Town Health Officer and town staff	New Homeowners	Every May	# of new homeowners receiving newsletter	While this happens in May because of Well Water Awareness day, we need to work on reaching new homeowners year round
Gaps: Example - None of the current efforts reach summer residents, most current work happens online, so people who are less computer savvy are not being reached.						
Community Resources: Example - The library has a great resource room and lots of people use it; there is a local private water testing company; our local newspaper is always looking for human interest stories, our community has a number of DES employees with content expertise.						

Be Well Informed Application

The screenshot shows a web browser window displaying the NHDES Be Well Informed Guide. The browser's address bar shows the URL `xml2.des.state.nh.us/DWTool/`. The website has a green header with the NHDES logo and navigation links for PUBLIC, GOVERNMENT, BUSINESS, and A to Z LIST. The main content area features a large banner with the title "The NHDES Be Well Informed Guide" and the subtitle "PROTECT YOUR FAMILY'S HEALTH AND HOME". Below this is a red button labeled "INFORMATION AND GUIDANCE FOR TREATING YOUR WELL WATER". To the right of the text are two images: a red apple being splashed with water and a young boy drinking from a glass. Below the banner, there is a paragraph of text explaining the purpose of the guide and a list of links: "DES Private Well Brochure", "Accredited Labs in NH", and "NHDES Private Well Testing Program".

be well informed - Search... Welcome

xml2.des.state.nh.us/DWTool/

an official NEW HAMPSHIRE government website

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

PUBLIC GOVERNMENT BUSINESS A to Z LIST

The NHDES Be Well Informed Guide

PROTECT YOUR FAMILY'S HEALTH AND HOME

INFORMATION AND GUIDANCE FOR TREATING YOUR WELL WATER

The **Be Well Informed** Guide from NHDES is designed to help you understand your water test results and, if your well water has commonly found pollutants in it, provide information about health concerns and water treatment choices. New Hampshire is fortunate to have an abundance of clean groundwater, and nearly half of New Hampshire's residents (over 500,000 people) rely solely upon domestic wells (also called "private wells") as their primary source of drinking water. While many private wells provide safe drinking water, certain pollutants like arsenic, iron and manganese are sometimes present in groundwater at levels that can affect your health and home.

NHDES recommends private well owners test their well water every three to five years for pollutants commonly found in New

- DES Private Well Brochure
- Accredited Labs in NH
- NHDES Private Well Testing Program

Potential Next Steps

- Continue to promote the use of the Well Water Community Action Toolkit
- Continue to serve as a resource to community partners
- Explore mental models and arsenic risk communication
- Study barriers to test kit return
- Study the relationship between real estate transactions and well water testing



Questions?



Thank You!!!

- Copies of our Year 1 and Year 2 grant reports, Exposure and Health Effects report, and the Well Water Community Action Toolkit are available on our website,
<http://www.dartmouth.edu/~toxmetal/arsenic/wellwater.html>
- Please contact me with follow up thoughts or questions-
Kathrin.Lawlor@Dartmouth.edu
- Special thanks to our partners:



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